

PennDOT ADCMS

May 2024 Workshop  
Summary Report

Contents

In-Person Workshop Dates and Location ..... 1

Goal and Objectives ..... 1

Links to Content ..... 2

Attendees Preworkshop Items ..... 2

Activities Before Workshop..... 2

Workshop Description ..... 3

Facilitators:..... 3

Schedule: May 7, 2024 (Tuesday) ..... 4

Schedule: May 8, 2024 (Wednesday)..... 5

Wrap-up and Conclusion Session Capture ..... 6

Recommended Priorities in openBIM Project Plan ..... 8

List of Appendices

- Appendix A. Post-Workshop Feedback: Summary of survey feedback, including training requests.
- Appendix B. Workshop Attendees: A list of attendees, organization, and contact information.
- Appendix C. Photos: Photos from the workshop.
- Appendix D. Workshop Slides: The slides used during the workshop.

In-Person Workshop Dates and Location

Tuesday, May 7th: 9:00 am – 5:00 pm

Wednesday, May 8th: 9:00 am – 12:30 pm

Location: HDR, PWC Conference Room  
2<sup>nd</sup> Floor of One Oxford Centre  
301 Grant St  
Pittsburgh, PA 15219

Goal and Objectives

Through the Advanced Digital Construction Management Systems (ADCMS) grant, PennDOT is piloting openBIM standards to produce model-based deliverables and collect digital as-built models for bridge projects. A core goal of the pilot projects is to provide constructors with IFC files as the contractual model, which requires educating the project team on workflows that produce quality IFC models. Initial education included a three-part webinar series on the fundamentals of openBIM

## **PennDOT ADCMS May 2024 Workshop Summary Report**

presented by buildingSMART. This series was a lead up to an in-person workshop to further educate the project team and discover additional training and educational requirements.

The goal of this 1½ day workshop is to help the ADCMS team members expand their knowledge and experience validating standard IFC models for compliance with the buildingSMART IFC File Validation Service and an Information Delivery Specification (IDS). These hands-on activities helped participants gain a detailed understanding of the various openBIM standards related to IFC, IDS, and the buildingSMART Data Dictionary (bSDD), which are fundamental to the development of a reliable openBIM information exchange.

### **Links to Content**

- ACCA Software: <https://www.accasoftware.com/en/information-delivery-specification-ids> (sign-up for free 30 IDS editor trial)
- BIM Works: We will sign up for accounts during the workshop at <https://bim.works>
- Link to Teams folder with IFC files: [IFC Files](#)
- bSI Validation Service: <https://validate.buildingsmart.org>
- buildingSMART Data Dictionary: <https://www.buildingsmart.org/users/services/buildingsmart-data-dictionary/>
- Link to AASHTO IDS at Teams Site: [AASHTO Bridge IDS](#)

### **Attendees Preworkshop Items**

- All attendees should bring a laptop to the workshop that can access the internet, and ideally, a two-button mouse with a scroll wheel.
- Attendees should review the [three webinar sessions](#) prior to the workshop (see below)
- Attendees should sign up for an [ACCA IDS Editor Trial license](#) prior to the event
- Attendees should sign up for a [bim.works](#) account prior to the event
- Attendees are advised to [register for a bSI account](#) prior to the event

### **Activities Before Workshop**

There were three webinar sessions prior to the workshop to prepare participants for the activities within this workshop. Recordings of these webinars are located on PennDOT's [Digital Delivery Resources](#) page under "ADCMS Webinars". The three webinars include:

- April 3, 2024: This session discusses openBIM standardization along with the role that buildingSMART International (bSI) plays within the standardization process.
- April 18, 2024: Industry Foundation Classes (IFC): This session presents the background and structure of the IFC standard along with a brief introduction to the buildingSMART's Solution for Data Dictionaries (bSDD) and IFC Validation Service.
- May 2, 2024: Information Delivery Specification (IDS) Overview: This session presents the core information exchange standards and tools that will be applied in the ADCMS Project, including IDS authoring, bSDD, and IFC.

### **Workshop Description**

During this hands-on workshop participants engaged in activities to learn how openBIM information requirements can be developed using IFC and IDS standards combined with introducing the bSI data dictionary (bSDD). The workshop was designed to allow participants to work with online software tools to create an IDS for a very small subset of information regarding a bridge, load an IFC bridge model to view the information, and check the bridge model to see if the information required in the IDS is complete and available in the model file. The participants also uploaded the TPF-5(372) BIM for Bridges and Structures IDS to view the requirements established by the Association of Highway and Transportation Officials (AASHTO) via the Committee on Bridges and Structures and the pooled fund members. The workshop concluded with an interactive session to highlight information learned, identify the needs of pilot project participants, and collect participant feedback regarding the most valuable aspects of the workshop and the items that could be improved (plus/delta) to assist in continuous improvement for future workshops.

The workshop consisted of the following main activities:

- Participants gained valuable context regarding how the shift to model-based openBIM standards and deliverables will impact the work tasks of designers, constructors, and project managers
- Presenter discussed the core openBIM concepts, including IFC and IDS
- Participants validated an IFC file(s) in compliance with buildingSMART schema via the Validation Service
- Participants developed a simple IDS for a unique project requirement or a standard PennDOT requirement
- Participants validated an IFC file(s) against a unique IDS
- Participants then looked at a larger IDS, and validated their IFC file against the IDS for the Design-to-Construction Data Exchange for Highway Bridges

### **Facilitators:**

- Léon van Berlo – Technical Director, buildingSMART International  
[Leon.vanBerlo@buildingSMART.org](mailto:Leon.vanBerlo@buildingSMART.org)
- John Messner – Charles & Elinor Matts Professor, Penn State  
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- Saleh Alghamdi – Graduate Research Assistant, Penn State  
[sja6110@psu.edu](mailto:sja6110@psu.edu)
- Marcia Yockey – Transportation Digital Delivery Services Advisor, HDR  
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- Alexa Mitchell – Enterprise Digital Delivery Service Director, HDR  
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**PennDOT ADCMS**  
**May 2024 Workshop Summary Report**

**Schedule: May 7, 2024 (Tuesday)**

8:00 – 9:00 am	<b>Breakfast and informal discussions</b>
9:00 – 9:15 am	<b>PennDOT Digital Delivery Program and the ADCMS Grant</b> Introduction from PennDOT and HDR with overview of this workshop, objectives the ADCMS grant, and the Digital Delivery Directive all tie together. <i>Allen Melley and Alexa Mitchell</i>
9:15 – 9:45 am	<b>Workshop Objectives and Participant Introductions</b> This session will include an overview of the workshop objectives along with personal introductions of everyone who is attending the workshop. We will explicitly discuss the goals for the various participants at the workshop, including designers, project managers, and other participants. <i>Facilitators: John and Léon</i>
9:45 – 10:05 am	<b>Icebreaker</b> This will be a group activity. <i>Facilitators: Marcia and Alexa</i>
10:05 -10:30 am	<b>What is IFC, why use IFC, and why is an ‘open’ exchange important?</b> Discussion of IFC and the importance of open information exchanges. Participants will gain an appreciation for the importance of ‘why’ we use IFC along with the challenges that are associated with openBIM exchanges. We will discuss the different versions of IFC, including what is new in IFC 4.3 (e.g., alignment support). <i>Lead facilitator: Léon</i>
10:30 – 10:45 am	Brief break
10:45 – 11:15 am	<b>Demonstrate exported IFC model (Hands-On Activity)</b> Participants will open their own IFC file, or a model from sample folder and review contents to gain an understanding of the fundamental structure of IFC files. The goal is to discuss the information that is contained within the export and show the outcome of IFC exports. We will have multiple IFC sample files and people will be encouraged to open multiple files to compare information available. This activity can be done in small groups. <i>Lead facilitator: Léon with technical support from John and Saleh</i> <i>Resources: Laptops and mice for all attendees</i>
11:15 – 11:30 am	<b>What is the IFC Validation Service?</b> Detailed discussion of the IFC validation service. The discussion will define the different types of validation that are included in the service, and how a user can understand the results of the validation. <i>Lead facilitator: Léon; with potential input from software vendors that want to showcase their file(s).</i>
11:30 – 12:00 pm	<b>Evaluate your IFC against the standard using the <a href="#">buildingSMART validation service</a> (Hands-On Activity)</b> This will be a hands-on activity to validate how your IFC (or an IFC file provided to participants) aligns with the IFC standard. Participants will be able to see and interpret the results of the validation service. We will also discuss the value of certification. Users are encouraged to register on <a href="https://validate.buildingsmart.org">validate.buildingsmart.org</a> <i>Lead facilitator: Leon with technical support from John and Saleh. Potentially also software vendors that want to showcase their file.</i> <i>Resources: Laptops and mice for all attendees</i>
12:00 – 1:00 pm	Lunch – Enjoy and relax



**PennDOT ADCMS**  
**May 2024 Workshop Summary Report**

1:00 – 1:30 pm	<b>AASHTO IDS</b> What is the AASHTO IDS? How was it created? Review of the requirements in the AASHTO IDS <i>Lead Facilitators: Léon</i>
1:30 – 2:00 pm	<b>AASHTO IDS</b> What is the AASHTO IDS for bridges? How do we evaluate and view this IDS? How can you use it in practice with additional other requirements? What is the IDS audit tool? How to check IFC against an IDS? <i>Lead Facilitators: Léon</i>
2:00 – 2:15 pm	Break
2:15 – 3:45 pm	<b>Build Your Own IDS (Hands-On Activity)</b> Create your own specification from scratch. Combine different specifications into one that suits your needs, and/or write your own IDS specification. Participants will also review the bSDD to help formulate the specification. We will discuss the bSDD and how it is used in developing an IDS. <i>Facilitators: Léon, John, and Saleh. With potential input from software vendors. This will be an interactive session for participants to develop their own IDS concepts.</i> <i>Resources: Laptops and mice for all attendees</i>
3:45 – 5:00 pm	<b>Summary of key lessons learned</b> Summarize the key lessons of the day's activities. Point everyone to the activities for tomorrow, including the activities in bim.works.

**Schedule: May 8, 2024 (Wednesday)**

8:00 – 9:00 am	Breakfast
9:00 – 11:00 am	<b>IFC file check against an IDS (Hands-On Activity)</b> Participants will check their IFC file (or a file provided to them) against the specifications documented in an IDS. Discuss the methodology to require a consistent IDS. How do you require the IDS? How do you leverage the bSDD to publish the requirements? Time was given to software vendors to demonstrate how their specific applications create, export, and receive IFC files. Vendors were with Trimble (Marcin Pszczolka) and Bentley Systems (Alan Esguerra). <i>Facilitator: Léon with support from John</i> <i>Resources: Laptops and mice for all attendees</i>
11:00 – 11:15 am	Break and informal discussion
11:15 – 12:30 pm	<b>Wrap-up and Conclusions (see documentation in section below)</b> We will have a final discussion of the core concepts presented throughout the workshop. We will entertain questions and concerns that will need to be addressed in the future. For example: what is the role of 'Model as a legal document' in this openBIM workflow? Workshop concluded with a 1-2-4-All facilitated session to capture the most important content learned; what participants need for success; and the plus/delta continuous improvement suggestions. A 1-2-4-All session allows people to individually identify items (1), then discuss with their neighbor (2), then 2 groups discuss (4), and then we had each group of 4 (or more) report out to everyone (All). <i>Facilitators: John with support from Saleh</i>
12:30 pm	End of Workshop

### **Wrap-up and Conclusion Session Capture**

The following sections outline the captured content from the workshop participants during the final Wrap-up and Conclusions session on day 2.

#### **Most Important Content Learned by Participants (captured from participants in a 1-2-4-All facilitated session):**

- To successfully validate, the IFC version in the models must match the IDS version. This was a problem encountered throughout the workshop. Some files were not properly formatted and had inconsistent IFC version text between IFC model file and IDS. For example, new Bentley IFC files from earlier in the year were on the previous IFC4X3 schema and would not successfully validate until the schema was updated to IFC4X3\_ADD2, which can be done quickly by opening the IFC file in Notepad and editing that value.
- End-user training will be critical to the success of the project. Training will need to include, but is not limited to, workflow for mapping IFC in design authoring software, standardized processes for validating IFC files prior to import into construction software, education on how classification can improve end-user outcomes, and utilizing IFC as the digital as-built. Training will be addressed in the openBIM Project Plan.
- openBIM does work and tools can be used to view and validate files. However, successful validation depends on properly trained users who know how to both correctly map data in their design authoring software and export files.
- Standards are important and they must be specific to ensure users make quality IFC models.
- Participants learned how to build an IDS using specialized IDS authoring software (ACCA, BIM Works) and various parts of the AASHTO IDS. PennDOT will need to maintain information delivery specifications for their various project types in the future. Modifying an IDS will rarely be part of a bridge or design engineer's duties. Model managers and the Digital Delivery group at PennDOT would be responsible for maintaining these so they are available when designers are ready to validate a file.
- There remain a lot of remaining development activities to be successful (vendor software export, IDS refinement, etc.)
- Participants gained an understanding of the basic concepts within the bSDD. Additional training on bSDD will be required.
- Participants learned how to use the various openBIM file types (.ifc, .ids)
- Participants gained confidence in the ability to review the openBIM files
- Trust in file content will be critical to the project's success

#### **What will participants need to be successful (captured from participants in a 1-2-4-All facilitated session):**

- There will be a need to expand beyond bridges to incorporate roadway work
- There is a need for a common storage location for everything related to the project, e.g., standard process, IDS files, IFC files, etc.
- Modifications to the AASHTO IDS are needed. The current version was created to be a single IDS that covered all possible workhorse bridges. Multiple IDS for different structure types could be more effective and should be investigated. Any element checked in the IDS should be required, not optional, so reviewers can use the output to confirm model requirements

**PennDOT ADCMS**  
**May 2024 Workshop Summary Report**

are met. For example, if the IFC file of a one-span bridge is checked against an IDS that requires a pier, the IFC file will fail that check. Then the designer can look at those results and confirm that a pier is not required. Alternatively, if an IFC file is accidentally mapped without girders and checked against an IDS where girders are optional, the file will pass the girder check. The reviewer has no option to confirm if the girders need to be included and will pass the file on believing it is complete. Failures support a robust QC process.

- There is a need for a common US Infrastructure classification system. Software vendors would benefit from a single system. The more divergence there is between states, the longer it will take for vendors to update software to the latest classification version. A common system also simplifies sharing infrastructure data with national databases and workflows for industry stakeholders working with multiple states and agencies. It will also allow for the development of common rule checking approaches across model files.
- Participants would like to see a workflow for making changes to modeled content (e.g., capturing issues, revisions in native model, re-export to IFC, validate new IFC, etc.)
- We will need an 'IFC police', or an information management validation role on the projects
- Training will be critical
- Having an appropriate on-boarding program will be critical
- Would be beneficial to have a high-level brief for the C-Suite/executive audience for companies that will be participating in the pilot projects
- There will need to be a clear definition of governance for the different content, including the standards
- Must consider additional costs for complying with the new requirements
- Need to guide the software vendor development efforts. Conducting a vendor workshop would be very valuable.
- Guidance and sharing lessons learned across the pilot projects (2 pilots in PennDOT along with other pilots in other DOTs) will be very valuable. These tasks are already included in the scope of work for the ADCMS grant.
- Need a clear quality management plan in place for the openBIM process and deliverables. The development of this quality management plan will be addressed in the openBIM Project Plan.

**Plus/Delta:** A review of what went well and what can be improved from the perspective of the participants:

**Plus:**

- Organization of the meeting and thanks to Dan, Carmella, and Marcia for arranging logistics
- In-person interaction was highly valued
- Hands-on activities were very useful
- Vendor participation was valued
- Having multiple types of subject matter experts in the room was helpful
- Ability to meet with people outside of workshop was beneficial, especially the ballgame (paid for by each individual outside of contract)

**Delta (or opportunities for improvement)**

- There was very limited representation of construction expertise (participants) in the room
- Terms can be confusing so it would be beneficial to ensure that we always clearly present terms and consider a location for quick look-up of terms
- A number of participants felt the workshop was too short and would have appreciated more time to go in-depth into topics
- Screen size in the room for demonstrations was small and it was difficult to follow content on-screen during sessions

Overall, the feedback from participants was very positive.

**Recommended Priorities in openBIM Project Plan**

The workshop provided an opportunity for many of the project participants to learn about openBIM, to experience the opportunities and challenges with using open standards, and to gain a common understanding of the goals for the openBIM initiative. It also provided valuable feedback regarding the future needs to ensure success on the pilot projects. The feedback will be addressed in the openBIM Project Plan, which will outline specific steps to achieve the openBIM workflow on the pilot projects. This plan will include the future steps and resources needed to ensure success.

Based on the workshop conclusions above and post-workshop feedback (Appendix A), the following items are of high priority in the openBIM Project Plan:

1. Workshop with software vendors, including Bentley, Autodesk, and Trimble and project team to sort through model authoring workflows for IFC mapping.
2. Engaging with the BIM for Bridges and Structures Transportation Pooled Fund (TPF) for potential improvements to the AASHTO IDS for highway bridges.
3. Standardized formats and workflows are essential to success. The plan should emphasize creation of these standards and methods for enforcing them.
4. Establish role categories defining how individuals will be impacted by IFC and what level of training/education they need to support adoption of openBIM. For example, leadership needs basic education on how openBIM affects staffing and workflows, whereas a BIM manager might be responsible for maintaining an IDS and validating files.
5. Workshop focused on construction software vendors to work through data import and priority use cases.
6. Establish a guidance framework for pilot project teams.
7. Develop a design to construction openBIM workflow, specific to software, that instills confidence.
8. Training plan for end users.
9. Training plan for creators (designers and model managers) that includes standards for IFC mapping, what data is exchanged, and downstream data needs.
10. Provide a workflow for making changes to modeled content (e.g., capturing issues, revisions in the native model, re-export to IFC, validating new IFC, etc.)

## Appendix A Post-Workshop Feedback

In addition to the 1-2-4 engagement during the workshop, attendees provided additional feedback, questions, and requests, mostly focused on existing knowledge gaps. This information fits into five categories: Proposed Workshops, Potential Engagements, Action Items, Additional Training and Education Needs, and General Feedback. The consultant team is using the information below to shape the openBIM Project Plan including what additional training and collaborations are necessary to create an educated project team able to produce and utilize quality IFC models.

### Proposed Workshops:

The Pittsburgh workshop was mostly positive experience for collaboration and identifying knowledge gaps. Feedback included recommendations for holding additional workshops that brought different people together to focus on specific areas of concern.

Focus Area	Proposed Workshops
Asset Management	Data exchange/extraction with asset management and vendors
Construction & Inspection	Host a vendor engagement/workshop focused on construction applications (Leica, TopCon, AGTEK, Trimble, etc.).  We want to avoid limiting contractors (software options) as it could negatively impact bids. Ideally, we want to show how software/workflow improves process, which would motivate contractors to adopt digital delivery.
Construction & Inspection	Construction bidding with contractors and Vendors
Design	Host a vendor engagement/workshop focused on design workflow and software applications - Bring Designers and Vendors together to sort model authoring workflow - (Bentley, Autodesk, Trimble, possibly Tekla). Prefer to include Autodesk since it is the Pennsylvania Turnpike's primary design software.
Survey	Need to prioritize survey. Surveyors do not have a good understanding of what we need in the models, how things talk to each other, or what the data does. Emphasize the importance of following standards.

### Potential Engagements:

Topics that involve collaboration beyond the ADCMS project and pilot teams to resolve. These topics could be incorporated into workshops but are likely to require regular communication and working sessions to settle on a solution or workflow.

Focus Area	Key Collaborator	Potential Engagement Topics
IDS	Industry	How will requested updates and customizations needed be conveyed back to the TPF, so that it is incorporated as needed and a repeatable and consistent process is in-place?

## Appendix A Post-Workshop Feedback

Focus Area	Key Collaborator	Potential Engagement Topics
IDS	Industry	Work with Thomas Liebich to work through current AASHTO IDS. Two different software applications will give you two different results for interpreting that IDS. Need to make sure that whatever we have passes through bSI's validation/verification
Software	Software Vendors	More time with and input by the vendors that may be involved in the project.
IFC Mapping	Software Vendors	How will the "tree" structure be incorporated into the Bentley IFC/Item Type mapping approach? This includes the IfcBridge > IfcBridgePart > ... hierarchy that is specified in the IDS.
Security	Software Vendors	The tools used for viewing the IFC and IDS files are SaaS for storing BIM models and data. Where are the servers that hold the data physically located and what is their mechanism to secure the data (cybersecurity is a critical issue). BIMworks' parent company seems located in the Netherlands. Are there US data centers that can keep the US DOT models and data within the US?

### Action Items:

Comments that can be easily acted upon or need to be incorporated into the openBIM Project Plan as tasks to be completed by the project team.

Focus Area	Key Collaborator	Action Items
Project Management	Pilot Teams	Need to break the two project teams into their own bi-weekly call. Have that regular touchpoint so that they know what they need to do and ensure we are providing the resources they need
Roles	Everyone	Need to do outreach to determine future roles and level of involvement of workshop attendees and members of design team - Identify suitable level of engagement for various roles going forward - Identify what assistance people need - Identify individuals to include in working sessions / workshops
Roles	PennDOT Digital Delivery Team	PennDOT to create 3 regional digital delivery positions that will be posted by summer and filled by fall. Should identify what their roles and tasks will be as well as what training they will need.
Workspace	PennDOT Digital Delivery Team	Identify workspace requirements for optimizing IFC workflows
Standards	PennDOT Digital Delivery Team	We need have to have standards set in stone to avoid building upon bad data and processes. Must find ways to prevent people submitting garbage
Standards	PennDOT Digital Delivery Team	Standard of enforcement. We need to set a workflow standard to make sure everybody is doing things the same way

## Appendix A Post-Workshop Feedback

### Additional Training and Education Needs:

Attendees learned a great deal from the three-part webinar series and the workshop. Feedback included a variety of topics that people would like the openBIM Project to cover. These topics are a mix of IFC basics and terminology that people wish they knew more about going into the workshop, workshop topics they would like covered in more detail, and topics beyond the scope of the workshop that we will need to address to successfully implement the IFC workflow.

Focus Area	Core Audience	Additional Training & Education Topics
Asset Management	Designers	Need to identify asset management needs prior to starting your design. Understand where you are going before you start the journey.
Certification / Validation	Everyone	Will there be an “approved” product list that the stakeholders (contractor, fabricators, etc.) can use to view and consume the IFC file deliverables? What will the designer be expected to check and in what software packages?
Certification / Validation	Pilot Teams	What certification/validation processes (software, IDS, IFC files, etc.) have been put in place AND will be available for these pilot project?
Construction & Inspection		IFC in Construction and Inspection: what IFC objects are available in 4.3 rev2 and what items we need to be creative with (drainage, utilities, etc.)
Data Exchange		Do we need to concern ourselves with how IFC transfers element geometry or the geospatial information? Do I need to be on the lookout for errors in how that data is transferred. Visually, it seems like the models come through clean in 4x3. Current AASHTO IDM eliminated almost all properties that are “derived” from the model. How do I ensure that this information that is being derived, by a measure tool for example, is valid? It seems like the buildingSMART validation tool and IDSs are focused solely on data tied to the object, not the geometric shape of the object itself.
Design	Pilot Teams	How will 2D Details and Notes be accounted for? Is it possible in IFC files or do we keep that in dgn/pdf file deliverable? Similar question for Annotated Views of the model.
Design	Pilot Teams	How are elements that are technically separate elements in terms of bridge classifications but are “combined” or poured together (i.e. deck and haunches or concrete end diaphragm and deck)? Do we simply classify the elements as decks and haunches in the IFC exchange?
IDM		A brief overview of what happens between an IDM being published and that information becoming usable in software.
IFC Basics and Terminology		Need education on terminology (definitions, classification hierarchy, object components, P_sets)
IFC Mapping		Applying IFC and the schema hierarchy seems confusing for everyone (including vendors)



## Appendix A

### Post-Workshop Feedback

Focus Area	Core Audience	Additional Training & Education Topics
IFC Mapping	Pilot Teams	How are elements like haunches classified in IFC 4x3 and the IDS? I didn't see that particular element mentioned in the IDS?
IFC Mapping	Pilot Teams	Should the PennDOT integral abutments be classified as abutment caps or pile caps in the IDS? Some additional descriptions/write-ups with illustrations would be very helpful for those mapping these elements to specific objects.
MVD		What is an MVD is and what is the Alignment Based Reference View? How does that relate to the IFC classes property sets and properties that we focused on in the training?
Roles		People still don't know what their roles are on this. What would a PM do with mapping IFC? How much does a person need to know to do their job?
The "Why"	Everyone	Long-term, PennDOT does not wish to dictate consultant software. Consultant should be able to choose any design applications that provide data that meets contractual standards.
The "Why"	PennDOT Leadership	Need visual educational materials for PennDOT leadership. Avoid documents that need to be read. Videos or informative imagery preferred. - Emphasize importance of standardization - Communicate that IFC is a deliverable that is data agnostic (not software agnostic) - Identify workflow changes and information sharing improvements
The "Why"	PennDOT Leadership	Find examples to share with leadership of how digital delivery has improved workflows and quality of information.
Workflows		Know the tools necessary to perform each process related to graphic and alphanumeric data: Development, export, verification, validation, exchange and extraction
Workflows		More on versioning and its importance with creating and checking the IFC vs your IDS
Workflows		An example walkthrough of designing, checking (engineering content), and validating (schema) of a project in IFC
Workflows		How IFC relates to modeled elements
Workflows		How to use IFC as a reference
Workflows		What properties are transferred in the IFC schema
Workflows		How to insure that IFC is applied to your model correctly
Workflows		Understanding the verification and validation process and tools

## Appendix A

### Post-Workshop Feedback

#### General Workshop Feedback:

Comments on how people felt about the pace of material and topics covered. The workshop included a variety of personas with information needs ranging from project managers (high level interest) to designers and workspace managers responsible for creating quality IFC files.

Category	General Workshop Feedback
Positive	Appreciate time given to the vendors and their ability to present on the fly.
Needed more training on basics	Help people gain a better understanding of IFC, IFC terminology, DD terminology, and IDS capabilities. Presentations assumed the audience had a better understanding of IFC than many attendees actually had.
Needed more training on basics	More introduction to topics and background would have been better. I am new to the process, but others could have benefitted as well.
Wanted fewer details	Valued the in-person exposure and team building. Did not need the in-depth nuts and bolts.
Wanted more details	Liked the sessions but would have preferred if Day 1 lasted 4 days: get an understanding of each dropdown, learn everything that is in the XML.

## Appendix B Attendee List

Organization	First	Last	Email	In-Person / Virtual
Bentley	Dan	Ahern	dan.ahern@bentley.com	Virtual
Bentley	Tim	Lawrence	tim.lawrence@bentley.com	Virtual
Bentley	Alex	Mabrich	alex.mabrich@bentley.com	Virtual
Bentley	Henrique	Nacamae	henrique.nacamae@bentley.com	Virtual
Bentley	James	Anding	James.Anding@Bentley.com	In-Person
Bentley	Alan	Esguerra	Alan.Esguerra@bentley.com	In-Person
bSI	Léon	van Berlo	leon.vanberlo@buildingsmart.org	In-Person
Gannett Fleming	Eric	Abrams	eabrams@geodecisions.com	In-Person
Gannett Fleming	Jon	McHugh	jmchugh@GFNET.com	In-Person
HDR	Matt	Blake	Matt.Blake@hdrinc.com	In-Person
HDR	Colby	Christensen	Colby.Christensen@hdrinc.com	In-Person
HDR	Dan	Giles	dan.giles@hdrinc.com	In-Person
HDR	Kevin	Martin	Kevin.Martin@hdrinc.com	In-Person
HDR	Alexa	Mitchell	alexa.mitchell@hdrinc.com	In-Person
HDR	John	Reese	John.Reese@hdrinc.com	In-Person
HDR	Grant	Schmitz	Grant.Schmitz@hdrinc.com	In-Person
HDR	Jennifer	Steen	Jennifer.Steen@hdrinc.com	In-Person
HDR	Marcia	Yockey	marcia.yockey@hdrinc.com	In-Person
HDR	Chris	Abbott	chris.abbott@hdrinc.com	In-Person
Iowa DOT	Jim	Hauber	James.Hauber@iowadot.us	In-Person
JMT	Mike	Fuller	MFuller@jmt.com	Virtual
JMT	Philip	Mashuda	PMashuda@jmt.com	Virtual
JMT	Scott	Livengood	SLivengood@jmt.com	In-Person
MBI	Joe	Brenner	joseph.brenner@mbakerintl.com	In-Person
MBI	Eddie	Leisio	Edward.Leisio@mbakerintl.com	In-Person
MBI	Tom	Monda	Thomas.Monda@mbakerintl.com	In-Person
MBI	Zacharie	Stonestreet	Zacharie.Stonestreet@mbakerintl.com	In-Person
MBI	Keith	Yoder	keith.yoder@mbakerintl.com	In-Person
PennDOT	Mark	Chappell	MARCHAPPEL@pa.gov	In-Person
PennDOT	Teresa	McClain	termcclain@pa.gov	In-Person
PennDOT	Scott	Mcmasters	SMCMASTERS@pa.gov	In-Person
PennDOT	Allen	Melley	amelley@pa.gov	In-Person
PennDOT	Tina	Deiterich	tdeiterich@pa.gov	In-Person
PennDOT	Mitchell	Fabry	mifabry@pa.gov	In-Person

## Appendix B Attendee List

Organization	First	Last	Email	In-Person / Virtual
PennDOT	Stephen	Schettler	sschettler@pa.gov	In-Person
PennDOT	Jason	Walker	jaswalker@pa.gov	In-Person
PennDOT	Eric	Weber	eweber@pa.gov	In-Person
PennDOT	Ryan	Bilger	ryabilger@pa.gov	In-Person
PSU	Saleh	Alghamdi	sja6110@psu.edu	In-Person
PSU	John	Messner	jim101@psu.edu	In-Person
SBI	Min	Song	min.song@sbi.international	In-Person
Trimble	Adrien	Patane	adrien_patane@trimble.com	In-Person
Trimble	Marcin	Pszczolka	marcin_pszczolka@trimble.com	In-Person

# PennDOT ADCMS Workshop

## Appendix C Photos





# PennDOT ADCMS Workshop

## Appendix C Photos



# **PennDOT ADCMS Workshop**

## **Appendix D**

### **Workshop Slides**





## IDS + IFC (and some bSDD/Validation around it)

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12:00 – 1:00 pm	Lunch – Enjoy and relax

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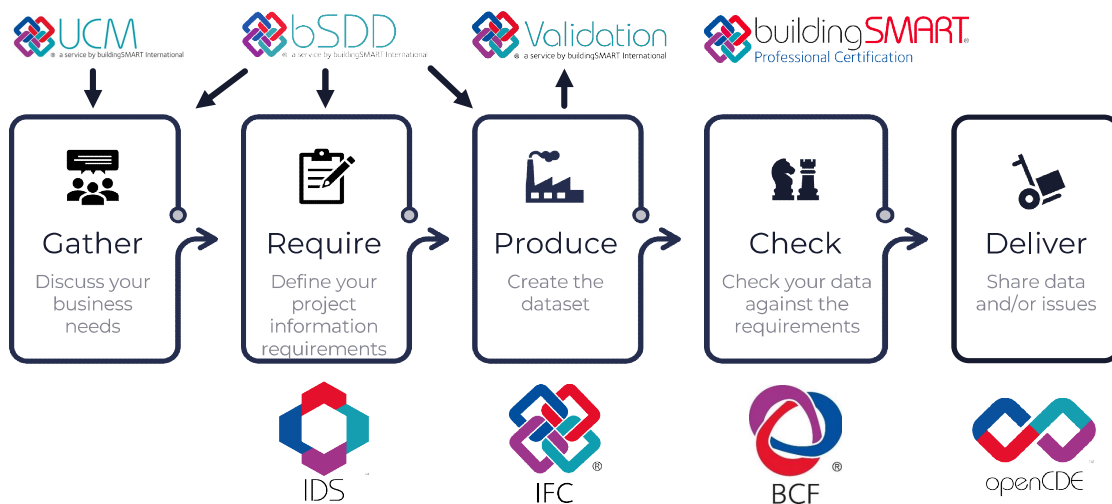




# Objectives and Participant Introductions

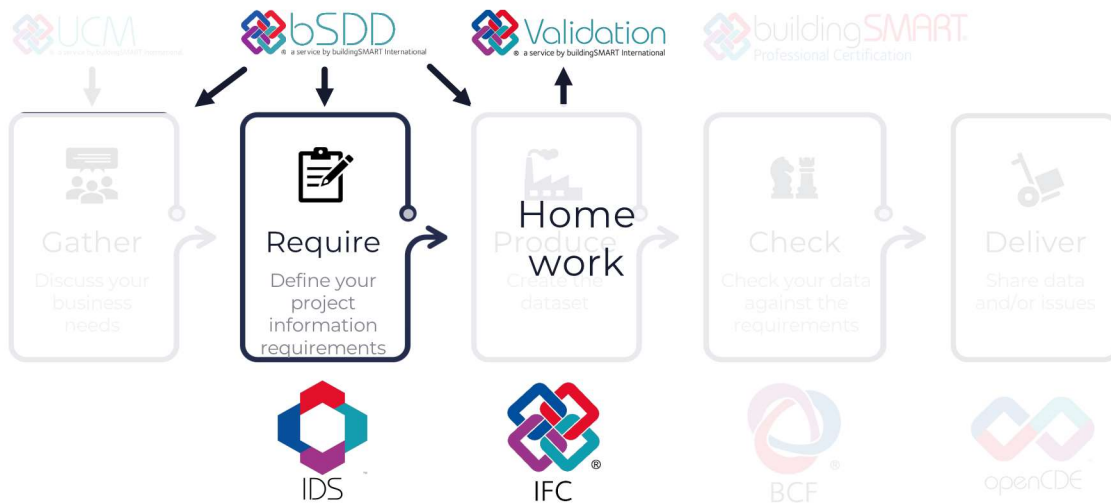
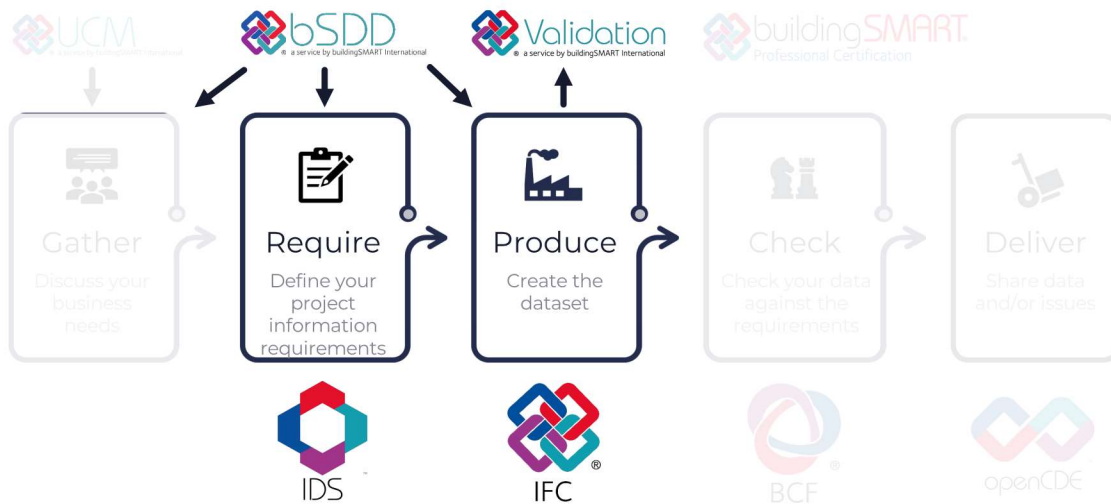
## Overview

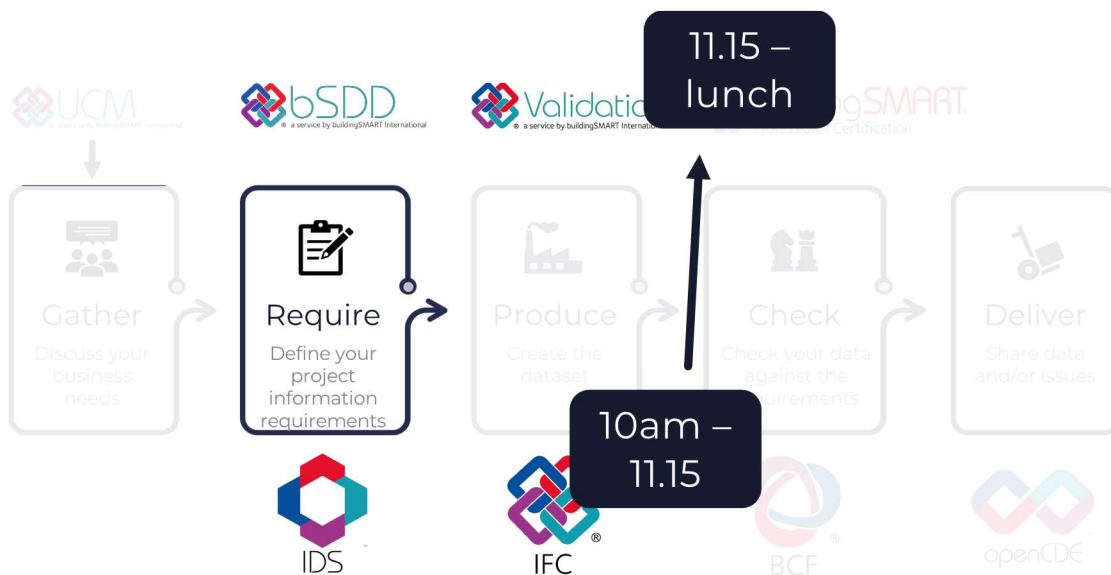
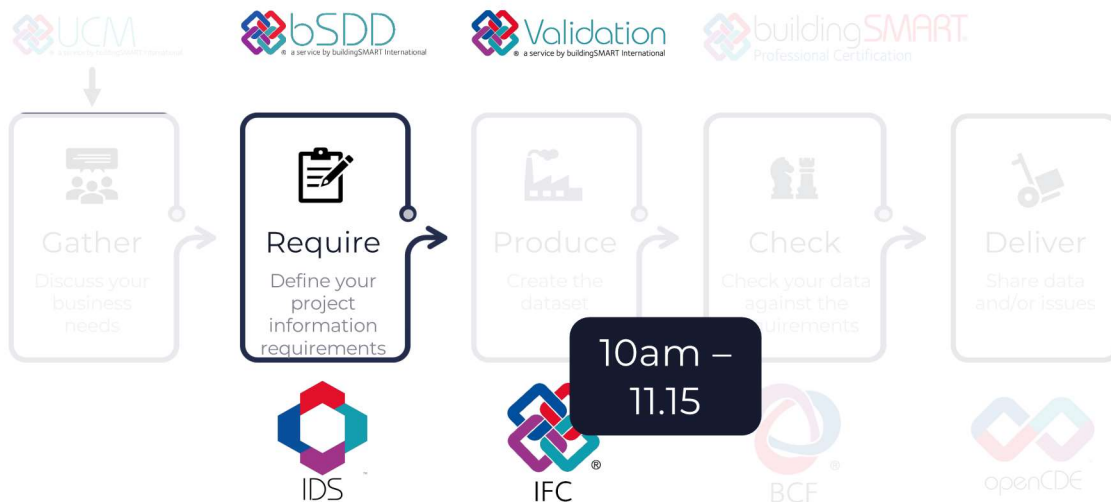
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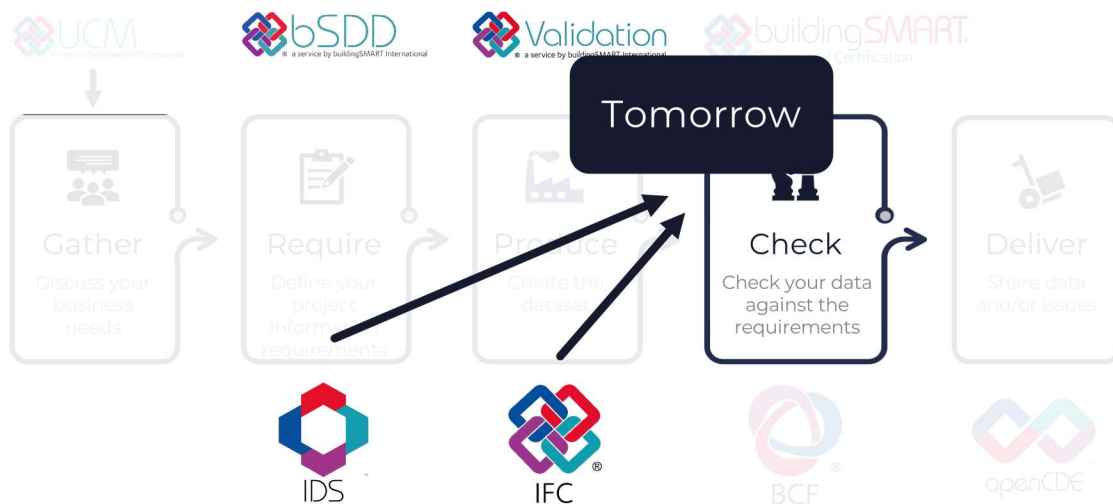
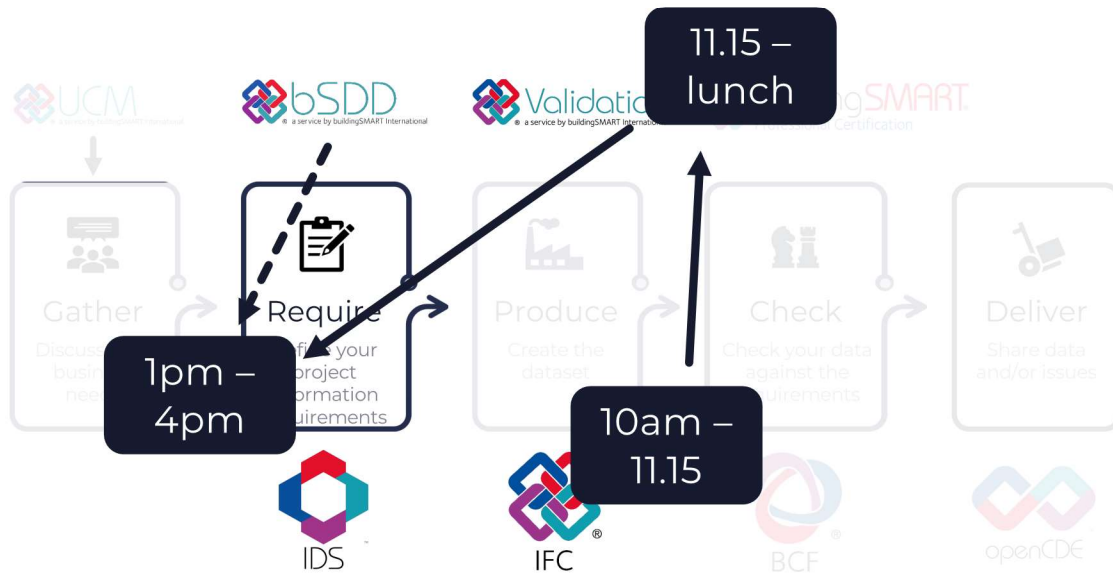


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# Who are you?

## And where are you in the workflow?

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# What is IFC, why use IFC?

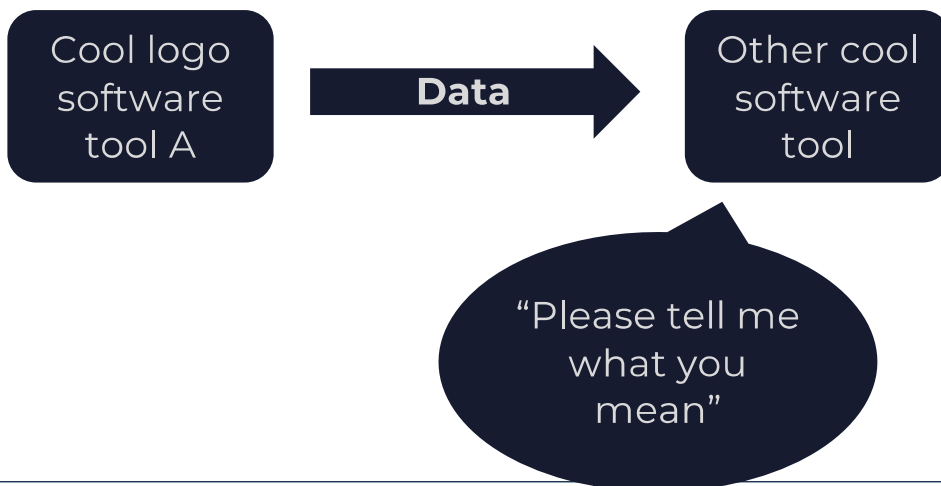
And why is an *open* exchange (not) important?

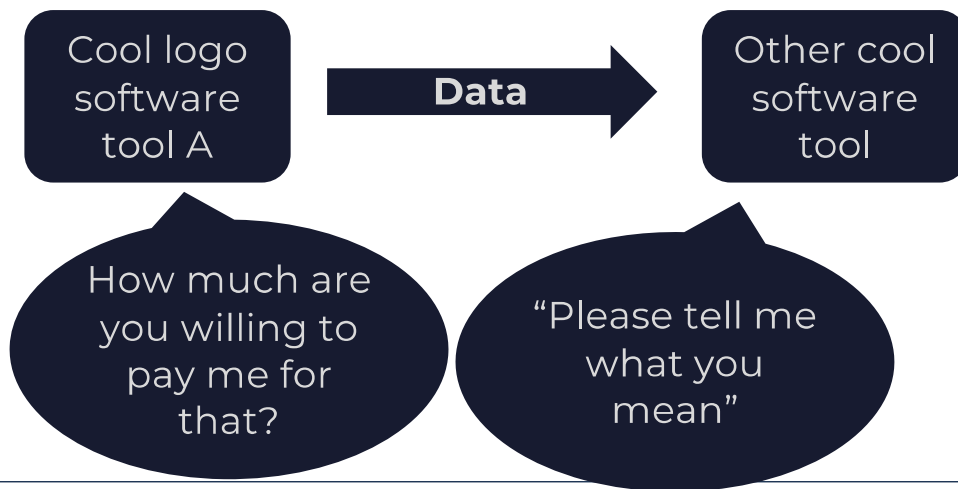


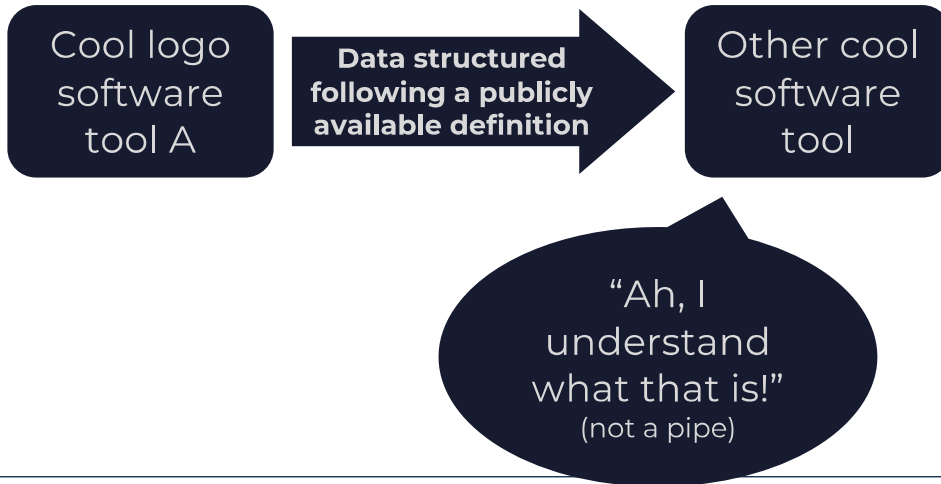




# So what is it?







IFC 4.3.10 (IFC4X3\_ADD1) development

Search

6.1.3.37 IfcStair

NOTE This entity is a subtype of *IfcProduct* or *IfcTypeProduct* and hence part of every standardized schema subset and implementation level.

6.1.3.37.1 Semantic definition

A stair is a vertical passageway allowing occupants to walk (step) from one floor level to another floor level at a different elevation. It may include a landing as an intermediate floor slab.

NOTE Definition according to ISO 6707-1: Construction comprising a succession of horizontal stages (steps or landings) that make it possible to pass on foot to other levels.

The *IfcStair* shall either be represented:

- as a stair assembly entity that aggregates all parts (stair flight, landing, etc. with own representations), or
- as a single stair entity without decomposition including all representation directly at the stair entity.

NOTE In case of an *IfcStair* being the aggregate of all parts of the stair the aggregation is handled by the *IfcRelAggregates* relationship, relating an *IfcStair* with the related *IfcStairFlight* and landings, *IfcSlab* with *PredefinedType*=LANDING, *IfcRailing*'s belonging to the stair may also be included into the aggregation.

NOTE Model View Definitions and implementer agreements may restrict the *IfcStair* being an assembly to not have an independent shape representation, but to always require that the decomposed parts have a shape representation. In this case, at least the "Body" geometric representations shall not be provided directly at *IfcStair* if it is an assembly. The "Body" geometric representation of the *IfcStair* is then the sum of the "Body" shape representation of the parts within the decomposition structure.

HISTORY New entity in IFC2.0.

IFC4-CHANGE Attribute *ShapeType* renamed to *PredefinedType*.

6.1.3.37.2 Entity inheritance

Diagram showing the inheritance hierarchy:

- IfcProduct* (Superclass)
- IfcObjectDefinition* (Subclass of *IfcProduct*)
- IfcObject* (Subclass of *IfcObjectDefinition*)
- IfcProduct* (Subclass of *IfcObject*)
- IfcElement* (Subclass of *IfcProduct*)
- IfcStair* (Subclass of *IfcElement*)

Other entities shown in the diagram include *IfcPropertyDefinition*, *IfcRelationship*, *IfcContext*, *IfcTypeObject*, *IfcActor*, *IfcControl*, *IfcAnnotation*, *IfcMapElement*, and *IfcStructuralItem*.

6.1.3.37.9 Changelog

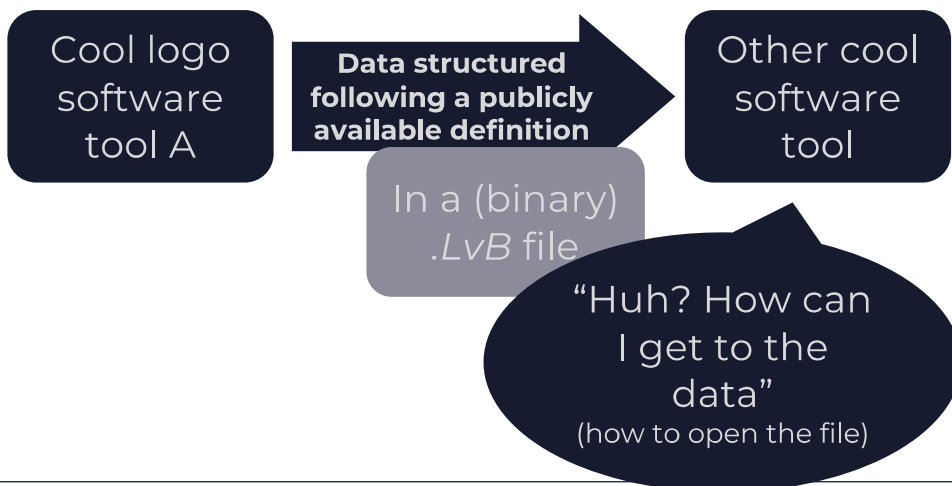
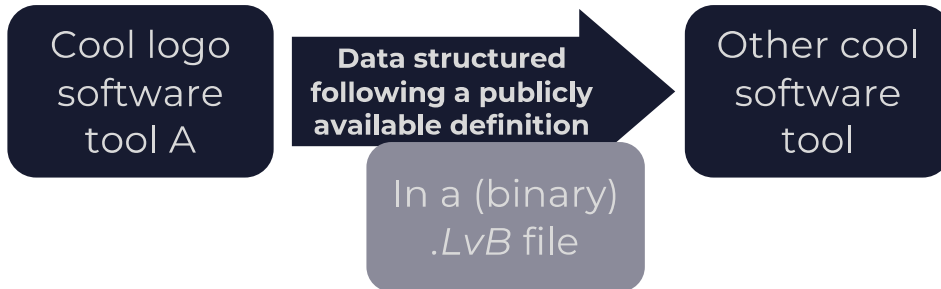
6.1.3.37.9.1 IFC4

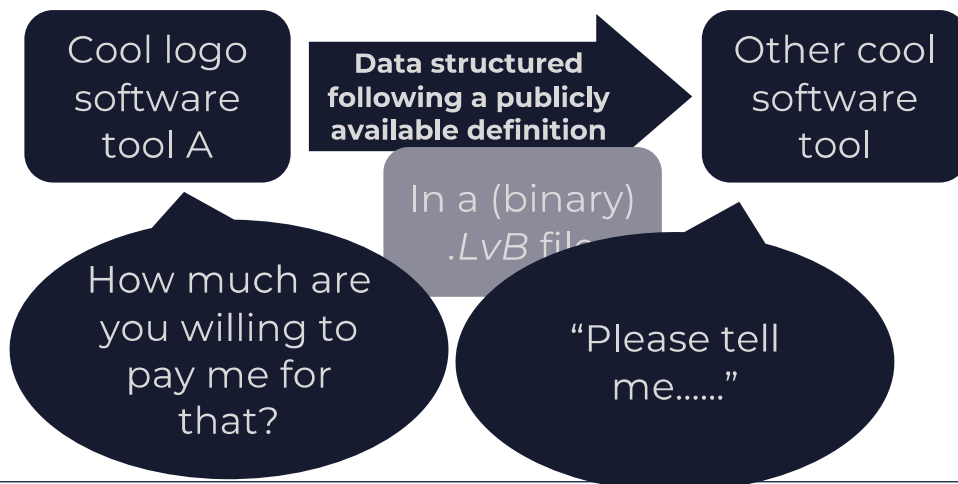
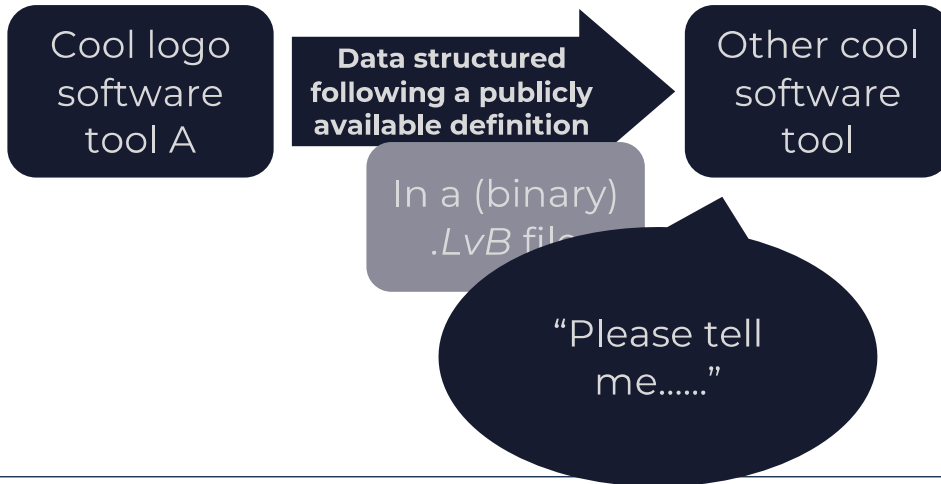
- where rule, *CorrectPredefinedType*
- where rule, *WRT*
- attribute *ShapeType* name, Changed from "ShapeType" to "PredefinedType"
- attribute *ShapeType* optional, Changed from "False" to "True"

6.1.3.37.9.2 IFC4.3\_DEV\_703a485

- supertypes, Changed from "BuildingElement" to "BuildingElement"

"Ah, I understand what that is!"  
(not a pipe)





## Some things to be aware off...

- **Yes, this means you can exchange IFC in different files**
- **Yes, this means IFC is not the same as a file format**

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- **Yes, this means you can exchange IFC in different files**
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- **There are many (official and non-official) IFC file formats**
  - **of which SPFF (the .ifc) is recommended**



## Some things to be aware off...

- **Yes, this means you can exchange IFC in different files**
- **Yes, this means IFC is not the same as a file format**
- **There are many (official and non-official) IFC file formats**
  - **of which SPFF (the .ifc) is recommended**
- **Yes, this means my .LvB format is also open**

## Why is open so important?

*An open standard is a standard that is openly accessible and usable by anyone.*

### To open it!

An open definition of a data standard allows everyone to interpret the data.

**Being able to always have the guarantee to access your data makes it the only real option for archiving.**

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# Why is open so important?

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An open definition of a data standard allows everyone to interpret the data.

**Stay in control of your data!**

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## Open workflow for you!

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## How much is it worth to you?

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12:00 – 1:00 pm	Lunch – Enjoy and relax



# Analyze your IFC file

What is in there? Is it a pipe?

---

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## Find an IFC file

Use your own; or get one from the example set.  
If possible try to look at multiple files.  
Use the viewer of your choice.

## Collaborate

Do this in groups.  
Organize a mixed roles group. So at least a BIM Author, manager, etc.  
Vendors please join different groups.

## Show and tell!

If you want: get ready to show your IFC.  
Feel free to grab the screen and present your IFC file.

---

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If you want: get ready to show your IFC.  
Feel free to grab the screen and present your IFC file.

## What to look at?

- Is there a 'tree structure'?
- Do the objects have 'meaning'?
- Are there properties attached to the objects?
- Is there a difference between files with version 2x3, 4 and 4.3?
- Are the properties 'official' or 'user defined'?
- Are there (smart) relations?
- Do the objects have materials?
- Is there enough data in the file to execute a certain task?
- Could you use this data in your job?
- Would this be good quality data for 30 year archiving?

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# When you are ready....

Try the IFC Validation service

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## What it is

The **IFC Validation Service** is an online platform, developed by buildingSMART, for checking IFC files against the IFC standard.



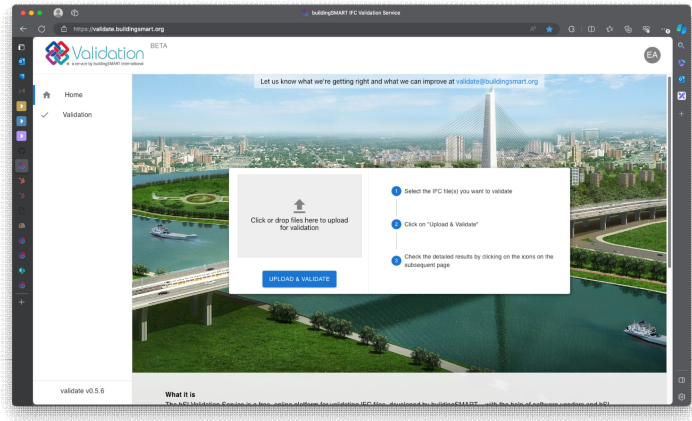
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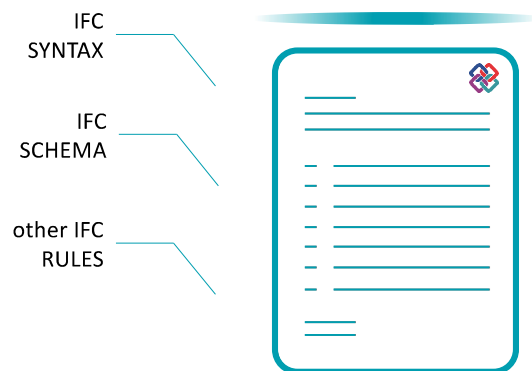
# What it does

## 1. Users upload an IFC file



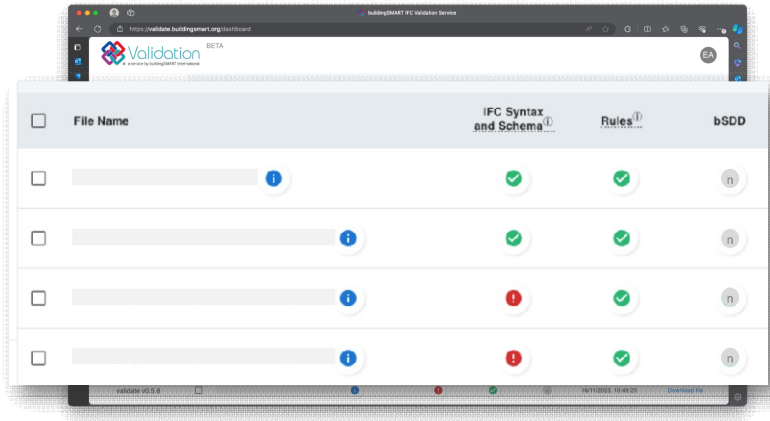
# What it does

1. **Users** upload an IFC file
2. **IFC Validation Service** check if the file conforms to:
  - a. IFC Syntax (**file format**)
  - b. IFC Schema (**data specification**)
  - c. Other normative rules of the IFC structure



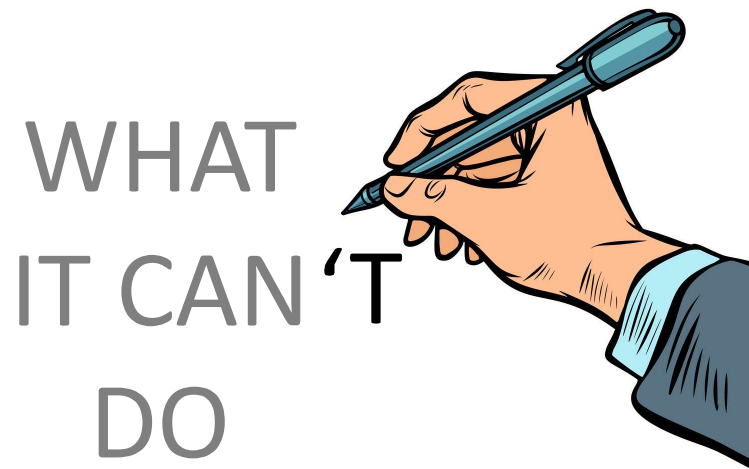
## What it does

1. **Users** upload an IFC file
2. **IFC Validation Service** check if the file conforms to:
  - a. IFC Syntax
  - b. IFC Schema
  - c. Other normative rules of IFC
3. **Users** get a judgment of conformity for the IFC file against the IFC standard



<input type="checkbox"/>	File Name	IFC Syntax and Schema	Rules	bSDD
<input type="checkbox"/>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>
<input type="checkbox"/>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>
<input type="checkbox"/>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>
<input type="checkbox"/>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>

## Scope



## Case-specific requirements

The IFC Validation Service does not check **project-specific, national-specific, organization-specific rules or constraints**.

**Case-specific validation** is where the mandate of the IFC Validation Service ends.



## Visualization

For multiple reasons, geometric visualisation is not within the scope nor the mandate of the IFC Validation Service.

Many errors are invisible in a viewer or unrelated to a geometric representation or prevent visualisation altogether.



# What it is

The **IFC Validation Service** is an online platform, developed by buildingSMART, for checking IFC files against the IFC standard.



<https://validate.buildingsmart.org/>

## What to look at?

- Is there a 'tree structure'?
- Do the objects have 'meaning'?
- Are there properties attached to the objects?
- Is there a difference between files with version 2x3, 4 and 4.3?
- Are the properties 'official' or 'user defined'?
- Are there (smart) relations?
- Do the objects have materials?
- Is there enough data in the file to execute a certain task?
- Could you use this data in your job?
- Would this be good quality data for 30 year archiving?
- **Is it valid?**

## Who goes first?

(any vendors showing off?)

### What to look at?

- Is there a 'tree structure'?
- Do the objects have 'meaning'?
- Are there properties attached to the objects?
- Is there a difference between files with version 2x3, 4 and 4.3?
- Are the properties 'official' or 'user defined'?
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- Do the objects have materials?
- Is there enough data in the file to execute a certain task?
- Could you use this data in your job?
- Would this be good quality data for 30 year archiving?
- **Is it valid?**

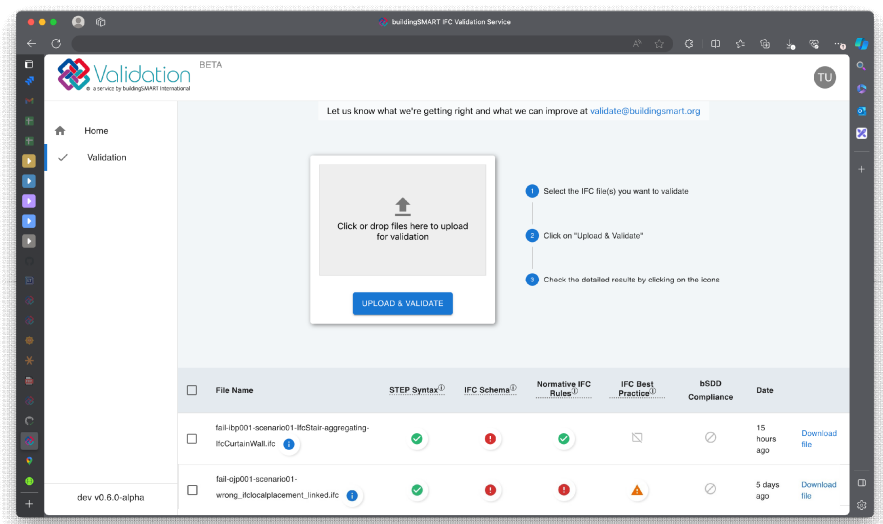


## IFC Validation service future

Just around the corner



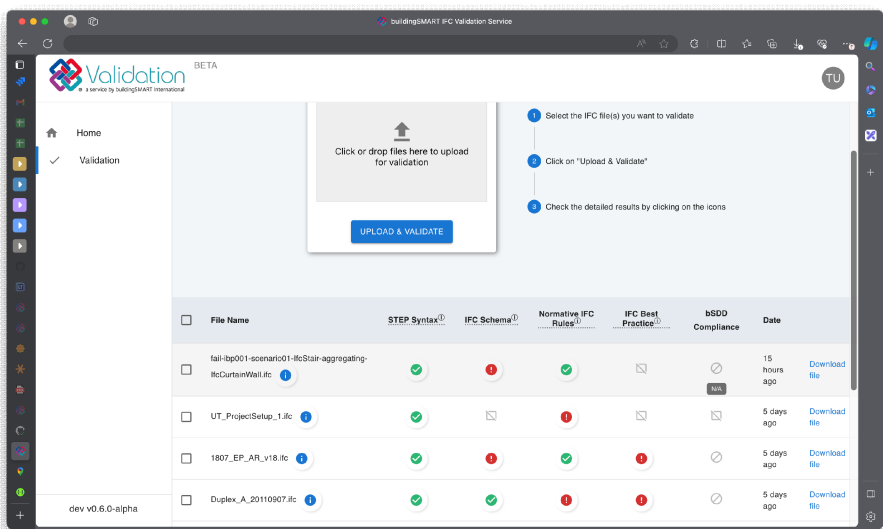
# Checks of industry practices (warnings)



© buildingSMART International 2024



# Not applicable status



© buildingSMART International 2024



You just used that!

Who noticed?



What are we working on next?

File name	File size	File date	Validation date	N. of geometries	N. of properties	IFC schema	MVD	Authoring tool	Version
Pipe_4x3_RC3_20230322...	318.25 KB	2021-01-12 10:11:59	2023-04-12 09:25:39	2	214	IFC4X3	no MVD detected	Bentley iModel IFC Export	22.3
Project definition	Built elements	Geometry representation	Object placement	Positioning elements	Spatial breakdown				
Georeferencing	Spaces	Mesh geometry	Local placement	Grid	Groups				
		Parametric geometry	Linear placement	Alignment					
Versioning / Revision control	Virtual elements	Voxel-based geometry	Grid placement	Referent	Assemblies				
		Point-based geometry							
Properties for objects	Quantities for objects	Object typing	Materials	Classification reference	Annotations				
Presentation layer	Costing	Scheduling of activities	Documentation reference	Library reference	Constraints				

The file is valid for this IFC feature

The file is not valid for this IFC feature

The file does not contain this IFC feature

8:00 – 9:00 am	Breakfast and informal discussions
9:00 – 9:15 am	PennDOT Digital Delivery Program and the ADCMS Grant Introduction from PennDOT and HDR with overview of this workshop, objectives the ADCMS grant, and the Digital Delivery Directive all tie together. <i>Allen Melley and Alexa Mitchell</i>
9:15 – 9:45 am	Workshop Objectives and Participant Introductions This session will include an overview of the workshop objectives along with personal introductions of everyone who is attending the workshop. We will explicitly discuss the goals for the various participants at the workshop, including designers, project managers, and other participants. <i>Facilitators: John and Léon</i>
9:45 – 10:05 am	Icebreaker This will be a group activity using Mentimeter. <i>Facilitators: HDR</i>
10:05 -10:30 am	What is IFC, why use IFC, and why is an ‘open’ exchange important? Discussion of IFC and the importance of open information exchanges. Participants will gain an appreciation for the importance of ‘why’ we use IFC along with the challenges that are associated with openBIM exchanges. We will discuss the different versions of IFC, including what is new in IFC 4.3 (e.g., alignment support). <i>Lead facilitator: Léon</i>
10:30 – 10:45	Brief break
10:45 – 11:15 am	Demonstrate exported IFC model (Hands-On Activity) Participants will open their own IFC file, or a model from sample folder and review contents to gain an understanding of the fundamental structure of IFC files. The goal is to discuss the information that is contained within the export and show the outcome of IFC exports. We will have multiple IFC sample files and people will be encouraged to open multiple files to compare information available. This activity can be done in small groups. <i>Lead facilitator: Léon with technical support from John and Saleh</i> <i>Resources: Laptops and mice for all attendees</i>
11:15 – 11:30 am	What is the IFC Validation Service? Detailed discussion of the IFC validation service. The discussion will define the different types of validation that are included in the service, and how a user can understand the results of the validation. <i>Lead facilitator: Léon; with potential input from software vendors that want to showcase their file(s).</i>
11:30 – 12:00 pm	Evaluate your IFC against the standard using the <b>buildingSMART validation service</b> (Hands-On Activity) This will be a hands-on activity to validate how your IFC (or an IFC file provided to participants) aligns with the IFC standard. Participants will be able to see and interpret the results of the validation service. We will also discuss the value of certification. Users are encouraged to register on <a href="https://validate.buildingsmart.org">validate.buildingsmart.org</a> <i>Lead facilitator: Leon with technical support from John and Saleh. Potentially also software vendors that want to showcase their file.</i> <i>Resources: Laptops and mice for all attendees</i>

## 12:00 – 1:00 Lunch – Enjoy and relax

1:00 – 1:30 pm	<b>AASHTO IDS</b> What is the AASHTO IDS? How was it created? And how does it align with ISO 19650? <i>Lead Facilitators: Léon for IDS, and John for 19650</i>
1:30 – 2:00 pm	<b>AASHTO IDS</b> What is the AASHTO IDS for bridges? How do we evaluate and view this IDS? How can you use it in practice with additional other requirements? What is the IDS audit tool? How to check IFC against an IDS? <i>Lead Facilitators: Léon</i>
2:00 – 2:10 pm	Break
2:00 – 3:45 pm	<b>Build Your Own IDS (Hands-On Activity)</b> Create your own specification from scratch. Combine different specifications into one that suits your needs, and/or write your own IDS specification. Participants will also review the bSDD to help formulate the specification. We will discuss the bSDD and how it is used in developing an IDS. <i>Facilitators: Léon, John, and Saleh. With potential input from software vendors. This will be an interactive session for participants to develop their own IDS concepts.</i> <i>Resources: Laptops and mice for all attendees</i>
3:45 – 5:00 pm	<b>Summary of key lessons learned</b> Summarize the key lessons of the day’s activities. Point everyone to the activities for tomorrow, including the activities in <a href="https://bim.works">bim.works</a> .

1:00 – 1:30 pm

#### **AASHTO IDS**

What is the AASHTO IDS? How was it created? And how does it align with ISO 19650?

*Lead Facilitators: Léon for IDS, and John for 19650*

1:30 – 2:00 pm

#### **AASHTO IDS**

What is the AASHTO IDS for bridges? How do we evaluate and view this IDS? How can you use it in practice with additional other requirements? What is the IDS audit tool? How to check IFC against an IDS?

*Lead Facilitators: Léon*

2:00 – 2:10 pm

Break

2:00 – 3:45 pm

#### **Build Your Own IDS (Hands-On Activity)**

Create your own specification from scratch. Combine different specifications into one that suits your needs, and/or write your own IDS specification. Participants will also review the bSDD to help formulate the specification. We will discuss the bSDD and how it is used in developing an IDS.

*Facilitators: Léon, John, and Saleh. With potential input from software vendors. This will be an interactive session for participants to develop their own IDS concepts.*

*Resources: Laptops and mice for all attendees*

3:45 – 5:00 pm

#### **Summary of key lessons learned**

Summarize the key lessons of the day's activities. Point everyone to the activities for tomorrow, including the activities in bim.works.

Let's have a look at the  
AASHTO IDS

<https://cloud.usbim.com/home/>

What I will do:


- Show it in Notepad
- Show it in XmlSpy
- Show it in ACCA
- Show the report generated
- Test it in buildingSMART IDS Audit tool

OpenfCViewer	Open Design Alliance	<ul style="list-style-type: none"> <li>• IFC 4 full</li> <li>• IFC 4.3 reference view</li> <li>• IFC 4.3 alignment view</li> <li>• IFC 4.3 full</li> <li>• bc4MML 2.1</li> </ul>
PAVE	PMG Projektmanagement GmbH	<ul style="list-style-type: none"> <li>• IFC 4.3 reference view</li> <li>• bc4MML 2.0</li> <li>• bc4MML 2.1</li> <li>• bc4MML 3.0</li> <li>• bcf API 2.0</li> <li>• bcf API 2.1</li> <li>• bcf API 3.0</li> <li>• IDS 1.0 authoring</li> </ul>
Planerly	Planerly	<ul style="list-style-type: none"> <li>• IFC 2x3 coordination view</li> <li>• IFC 2x3 full</li> <li>• IFC 2x3 custom</li> <li>• IFC 4 reference view</li> <li>• IFC 4 full</li> <li>• IFC 4 custom</li> <li>• IFC 4.3 reference view</li> <li>• IFC 4.3 alignment view</li> <li>• IFC 4.3 full</li> <li>• IFC 4.3 custom</li> <li>• IDS 1.0 authoring</li> <li>• b360 read API</li> <li>• b360 IFC export (including URIs)</li> </ul>
uBIM	ACCA Software S.p.A.	<ul style="list-style-type: none"> <li>• IFC 2x3 coordination view</li> <li>• IFC 2x3 full</li> <li>• IFC 2x3 custom</li> <li>• IFC 4 reference view</li> <li>• IFC 4 full</li> <li>• IFC 4 custom</li> <li>• IFC 4.3 reference view</li> <li>• IFC 4.3 alignment view</li> <li>• IFC 4.3 full</li> <li>• IFC 4.3 custom</li> <li>• bc4MML 2.0</li> <li>• bc4MML 2.1</li> <li>• bc4MML 3.0</li> <li>• IDS 1.0 authoring</li> <li>• b360 read API</li> <li>• b360 submit/manage</li> <li>• b360 IFC export (including URIs)</li> <li>• Foundation API 1.0</li> <li>• Documents API 1.0</li> </ul>
uBIM-IDS	ACCA Software S.p.A.	<ul style="list-style-type: none"> <li>• IFC 2x3 coordination view</li> <li>• IFC 2x3 full</li> <li>• IFC 2x3 custom</li> <li>• IFC 4 reference view</li> <li>• IFC 4 full</li> <li>• IFC 4 custom</li> <li>• IFC 4.3 reference view</li> <li>• IFC 4.3 alignment view</li> <li>• IFC 4.3 full</li> <li>• IFC 4.3 custom</li> <li>• IDS 1.0 authoring</li> </ul>

<https://technical.buildingsmart.org/resources/software-implementations/>

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<https://technical.buildingsmart.org/resources/software-implementations/>


Home Standards Services Resources

## Software Implementations

[Edit](#)

This page lists which software tools support what openBIM standards and services. You can use the search and filter capabilities to quickly find a tool that might support what you need.

IMPORTANT: these entries are maintained by the software vendors themselves. They 'self-report' the capabilities of their tools. This shows who edited the entry at what date/time. BuildingSMART does NOT verify the claims in this list.

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Want to add a new entry? Use the [Add software Entry](#) link.

[GitHub page](#)  
[Sample files](#)  
[IFC Implementation Guidance](#)  
[buildingSMART Standards database](#)  
[Technical Roadmap](#)  
[Software Implementation overview](#)


1:00 – 1:30 pm	<b>AASHTO IDS</b> What is the AASHTO IDS? How was it created? And how does it align with ISO 19650? <i>Lead Facilitators: Léon for IDS, and John for 19650</i>
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<b>2:00 – 2:10 Break</b>	
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## Hands on

<https://www.accasoftware.com/en/information-delivery-specification-ids>



[BIM Software](#) > [usBIM](#) > [IDS](#)

## IDS BIM – Information Delivery Specification

# usBIM.IDS

The **IDS (Information Delivery Specification)** standard allows optimal management of the information exchange in BIM projects.

With usBIM.IDS designers and buyers can take full advantage of this powerful standard and work much faster and smarter.

Use IDS editor for free

Try IDS validator for free

Activate your 2 months free trial from usBIM now!

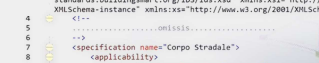
You have **15 free online applications** with 10 GB of cloud storage space

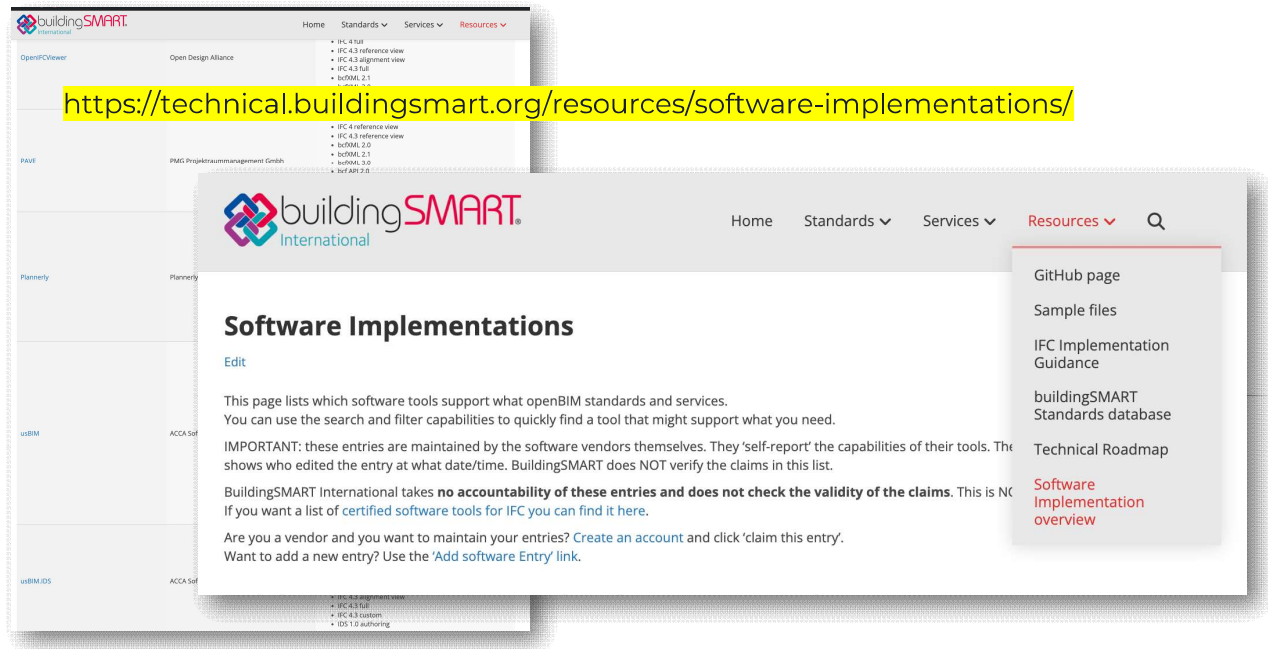
[BIM Software](#) > [usBIM](#) > [IDS](#)

[Explore](#) > [Get Support](#) > [Learn](#) > [Try for free](#) > [Buy](#)

```

1  <?xml version="1.0" encoding="UTF-8"?>
2
3  <ids xmlns="http://standards.buildingsmart.org/IDS"
4      xmlns:location="http://standards.buildingsmart.org/IDS/2011/standard/buildingsmart.org/IDS/ids/1.0" xmlns:xs="http://www.w3.org/2001/XMLSchema"
5  >
6      <!--
7      .....ONISSI.....
8      -->
9      <specification name="Corpo Stradale">
10         <applicability>
11             <classification location="instance">
12                 <valueCSOB/value>
13                     systemCorpo Stradale/system
14                 </classification>
15             </applicability>
16             <requirements/>
17         </specification>
18         <specification name="Sezione in Rilevato"
19             <applicability>
20                 <classification location="instance">
21                     systemSezione in Rilevato/system
22                 </classification>
23             </applicability>
24         </specification>
25     </ids>
26 
```





## What I will do:

- Start from scratch
- Show how to search bSDD
- Export to idsXML
- Show URIs in idsXML

1:00 – 1:30 pm	<b>AASHTO IDS</b> What is the AASHTO IDS? How was it created? And how does it align with ISO 19650? <i>Lead Facilitators: Léon for IDS, and John for 19650</i>
1:30 – 2:00 pm	<b>AASHTO IDS</b> What is the AASHTO IDS for bridges? How do we evaluate and view this IDS? How can you use it in practice with additional other requirements? What is the IDS audit tool? How to check IFC against an IDS? <i>Lead Facilitators: Léon</i>
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3:45 – 5:00 pm	<b>Summary of key lessons learned</b> Summarize the key lessons of the day's activities. Point everyone to the activities for tomorrow, including the activities in bim.works.

## What you learned:

- What 'open' means
- Why open is important  
(and maybe even how much you are willing to pay for it?)
- The difference between IFC and a .ifc file
- To use the IFC validation service
- What an IDS is
- To create an IDS file!

**Congratulations!**

**You now know more than**

**redacted**

# Tomorrow will be even better!

# Tomorrow will be even better!

**Make sure you register an account on <https://bim.works>**

# Questions?

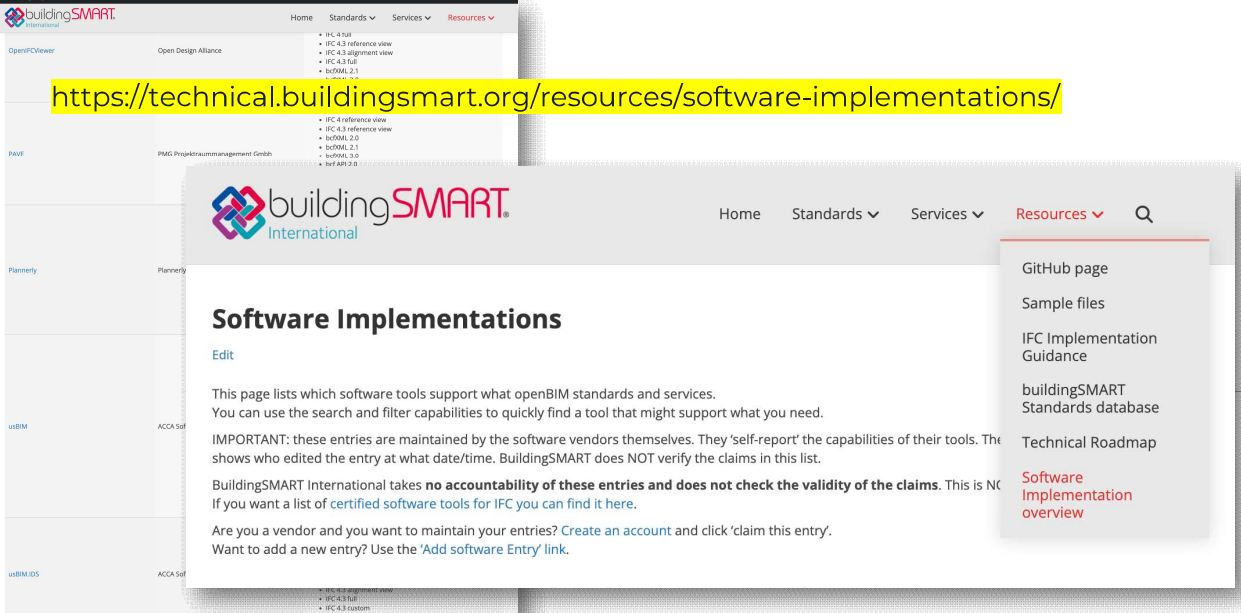
Leon.vanBerlo@buildingsmart.org  
technical@buildingsmart.org



# The next day

Bring the IFC and IDS together

Make sure you *have* an account on <https://bim.works>  
and start uploading a/your IFC



<https://technical.buildingsmart.org/resources/software-implementations/>

## Software Implementations

[Edit](#)

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- GitHub page
- Sample files
- IFC Implementation Guidance
- buildingSMART Standards database
- Technical Roadmap
- Software Implementation overview



**Make sure you *have* an account on <https://bim.works>**

**or start uploading a/your IFC to any other tool of choice**

(tip: you can use ACCA usBIM as well!)

**Any thoughts about yesterday?**

**What I will do:**

- **Upload IFC to bim.works**
- **Upload IDS to bim.works**
- **Check IFC against IDS**
- **Show results**

8:00 – 9:00 am

Breakfast

9:00 – 11:00 am

### **IFC file check against an IDS(Hands-On Activity)**

Participants will check their IFC file (or a file provided to them) against the specifications documented in an IDS. Discuss the methodology to require a consistent IDS. How do you require the IDS? How do you leverage the bSDD to find requirements?

*Facilitator: Léon with support from John*

*Resources: Laptops and mice for all attendees*

11:00 – 11:15 am

Break and informal discussion

11:15 – 12:30 pm

### **Wrap-up and conclusions**

We will have a final discussion of the core concepts presented throughout the workshop. We will entertain questions and concerns that will need to be addressed in the future. For example: what is the role of 'Model as a legal document' in this openBIM workflow?

*Facilitators: John. Note taker: Saleh*

12:30 pm

End of Workshop

8:00 – 9:00 am

Breakfast

9:00 – 11:00 am

### **IFC file check against an IDS(Hands-On Activity)**

Participants will check their IFC file (or a file provided to them) against the specifications documented in an IDS. Discuss the methodology to require a consistent IDS. **How do you require the IDS? How do you leverage the bSDD to find requirements?**

*Facilitator: Léon with support from John*

*Resources: Laptops and mice for all attendees*

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*Facilitators: John. Note taker: Saleh*

12:30 pm

End of Workshop

## What I will do:

- **Show advanced features of IDS**
  - **Including bSDD**
- **Show UCM?**

8:00 – 9:00 am

Breakfast

9:00 – 11:00 am

### **IFC file check against an IDS(Hands-On Activity)**

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*Facilitator: Léon with support from John*

*Resources: Laptops and mice for all attendees*

**11:00 – 11:15**

### **Break and informal discussion**

11:15 – 12:30 pm

### **Wrap-up and conclusions**

We will have a final discussion of the core concepts presented throughout the workshop. We will entertain questions and concerns that will need to be addressed in the future. For example: what is the role of 'Model as a legal document' in this openBIM workflow?

*Facilitators: John. Note taker: Saleh*

12:30 pm

End of Workshop

8:00 – 9:00 am Breakfast

9:00 – 11:00 am **IFC file check against an IDS(Hands-On Activity)**

Participants will check their IFC file (or a file provided to them) against the specifications documented in an IDS. Discuss the methodology to require a consistent IDS. How do you require the IDS? How do you leverage the bSDD to publish the requirements?

*Facilitator: Léon with support from John*

*Resources: Laptops and mice for all attendees*

11:00 – 11:15 Break and informal discussion

11:15 – 12:30 pm **Wrap-up and conclusions**

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*Facilitators: John. Note taker: Saleh*

12:30 pm End of Workshop

**Questions?**

Leon.vanBerlo@buildingSMART.org  
technical@buildingSMART.org

## **My Questions:**

## **My Questions:**

### **What is “Model as a Legal Document” (MALD)**

## **Frequently Asked Questions:**

**Where do I find a list of software that support IDS authoring and checking?**

## **Frequently Asked Questions:**

**How do I know my IDS has all the info I need?**

## **Frequently Asked Questions:**

**How can I be sure the IFC object is  
actually what it says it is?  
(a pipe)**

## **Frequently Asked Questions:**

**What is openCDE?**



# Not enough asked Questions: How can I help buildingSMART?

8:00 – 9:00 am	<b>Breakfast and informal discussions</b>
9:00 – 9:15 am	<b>PennDOT Digital Delivery Program and the ADCMS Grant</b> Introduction from PennDOT and HDR with overview of this workshop, objectives the ADCMS grant, and the Digital Delivery Directive all tie together. <i>Allen Melley and Alexa Mitchell</i>
9:15 – 9:45 am	<b>Workshop Objectives and Participant Introductions</b> This session will include an overview of the workshop objectives along with personal introductions of everyone who is attending the workshop. We will explicitly discuss the goals for the various participants at the workshop, including designers, project managers, and other participants. <i>Facilitators: John and Léon</i>
9:45 – 10:05 am	<b>Icebreaker</b> This will be a group activity using Mentimeter. <i>Facilitators: HDR</i>
10:05 – 10:30 am	<b>What is IFC, why use IFC, and why is an 'open' exchange important?</b> Discussion of IFC and the importance of open information exchanges. Participants will gain an appreciation for the importance of 'why' we use IFC along with the challenges that are associated with openBIM exchanges. We will discuss the different versions of IFC, including what is new in IFC 4.3 (e.g., alignment support). <i>Lead facilitator: Léon</i>
10:30 – 10:45 am	Brief break
10:45 – 11:15 am	<b>Demonstrate exported IFC model (Hands-On Activity)</b> Participants will open their own IFC file, or a model from sample folder and review contents to gain an understanding of the fundamental structure of IFC files. The goal is to discuss the information that is contained within the export and show the outcome of IFC exports. We will have multiple IFC sample files and people will be encouraged to open multiple files to compare information available. This activity can be done in small groups. <i>Lead facilitator: Léon with technical support from John and Saleh</i> <i>Resources: Laptops and mice for all attendees</i>
11:15 – 11:30 am	<b>What is the IFC Validation Service?</b> Detailed discussion of the IFC validation service. The discussion will define the different types of validation that are included in the service, and how a user can understand the results of the validation. <i>Lead facilitator: Léon; with potential input from software vendors that want to showcase their file(s).</i>
11:30 – 12:00 pm	<b>Evaluate your IFC against the standard using the <u>buildingSMART validation service</u> (Hands-On Activity)</b> This will be a hands-on activity to validate how your IFC (or an IFC file provided to participants) aligns with the IFC standard. Participants will be able to see and interpret the results of the validation service. We will also discuss the value of certification. Users are encouraged to register on <a href="https://validate.buildingsmart.org">validate.buildingsmart.org</a> <i>Lead facilitator: Leon with technical support from John and Saleh. Potentially also software vendors that want to showcase their file.</i> <i>Resources: Laptops and mice for all attendees</i>
12:00 – 1:00 pm	Lunch – Enjoy and relax

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1:00 – 1:30 pm	<b>AASHTO IDS</b> What is the AASHTO IDS? How was it created? And how does it align with ISO 19650? <i>Lead Facilitators: Léon for IDS, and John for 19650</i>
1:30 – 2:00 pm	<b>AASHTO IDS</b> What is the AASHTO IDS for bridges? How do we evaluate and view this IDS? How can you use it in practice with additional other requirements? What is the IDS audit tool? How to check IFC against an IDS? <i>Lead Facilitators: Léon</i>
2:00 – 2:10 pm	Break
2:00 – 3:45 pm	<b>Build Your Own IDS (Hands-On Activity)</b> Create your own specification from scratch. Combine different specifications into one that suits your needs, and/or write your own IDS specification. Participants will also review the bSDD to help formulate the specification. We will discuss the bSDD and how it is used in developing an IDS. <i>Facilitators: Léon, John, and Saleh. With potential input from software vendors. This will be an interactive session for participants to develop their own IDS concepts.</i> <i>Resources: Laptops and mice for all attendees</i>
3:45 – 5:00 pm	<b>Summary of key lessons learned</b> Summarize the key lessons of the day's activities. Point everyone to the activities for tomorrow, including the activities in bim.works.

8:00 – 9:00 am	Breakfast
9:00 – 11:00 am	<b>IFC file check against an IDS(Hands-On Activity)</b> Participants will check their IFC file (or a file provided to them) against the specifications documented in an IDS. Discuss the methodology to require a consistent IDS. How do you require the IDS? How do you leverage the bSDD to publish the requirements? <i>Facilitator: Léon with support from John</i> <i>Resources: Laptops and mice for all attendees</i>
11:00 – 11:15 am	Break and informal discussion
11:15 – 12:30 pm	<b>Wrap-up and conclusions</b> We will have a final discussion of the core concepts presented throughout the workshop. We will entertain questions and concerns that will need to be addressed in the future. For example: what is the role of 'Model as a legal document' in this openBIM workflow? <i>Facilitators: John. Note taker: Saleh</i>
12:30 pm	End of Workshop

## 1-2-4-All

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- Meet individually (2 minutes)
- Meet with people at your table (or 2 or 3 people) (2 minutes)
- Meet with one other group (4 minutes)
- Group report out

**What are the most important items that you learned from our sessions?**



## 1-2-4-All

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- Meet individually (2 minutes)
- Meet with people at your table (or 2 or 3 people) (2 minutes)
- Meet with one other group (4 minutes)
- Group report out

**What do you (or your team) need to support the implementation of IFC?**



## Discussion and Questions



## Key Takeaways

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- Importance of openBIM for archival information
- Importance of openBIM to allow for broad interoperability
- Importance of well-defined information requirements (in IDS)
- IFC provides the data schema to store data
- bSDD provides the foundational definitions
- IDS provides a structure for requirements for deliverable
- Once high-quality IFC - Opens the door to many added uses



## Plus - Delta

